The Summer Undergraduate Research Fellowship (SURF) Symposium
6 August 2015
Purdue University, West Lafayette, Indiana, USA

Improvement of Diesel Engines at High Speeds via Flexible Valve Actuation and Cylinder Deactivation

Dina M. Caicedo Parra
School of Mechanical Engineering, Iowa State University
Aswin Ramesh and Gregory Shaver
School of Mechanical Engineering, Purdue University

ABSTRACT

In the U.S fuel consumption is expected to increase over 20% from 2010 to 2020 especially in the heavy duty segment. As a consequence of the increase in production of heavy and light duty vehicles, regulations and stricter policies are being applied to the emissions of pollutants, including NOx, and soot. This study outlines strategies for using cylinder deactivation and intake valve closure (IVC) modulation to improve fuel economy and increase the rate at which NOx/soot-mitigating aftertreatment devices reach working temperatures. Effects of opening and squeezing variable geometry turbine (VGT) turbocharger were also analyzed. From the results it was observed that by opening up VGT the fuel consumption decreased approximately 20%. In almost every case, CDA, LIVC (late intake valve close) and EIVC (early intake valve close) does not show additional benefits for fuel consumption. However**,** CDA increased the turbine out temperature (TOT) in excess of 100°C. These outcomes showed that CDA has a positive impact on after-treatment thermal management by increasing TOT, which is required for a better performance.

KEYWORDS

Valve Actuation, Cylinder Deactivation, Diesel Engine, After-treatment System